

What is claimed is:

1. A method for searching an algebraic codebook in algebraic code excited linear prediction (ACELP) vocoding 5 using a depth first tree method, the method comprising the steps of:

- a) searching nodes of a tree at predetermined levels in order to predict a branch in which optimum pulse is located;
- b) choosing a predetermined number of branches according 10 to the search result of the step a) and removing residual branches; and
- c) searching the chosen branches and choosing optimum algebraic code.

15 2. The method as recited in claim 1, wherein step a) includes the steps of:

- a1) determining a level 'L' at which branches are searched;
- a2) finding maximum values of each track;
- 20 a3) fixing a maximum value in total tracks as a first pulse;
- a4) fixing a maximum value in a next track blow the track at which the first pulse is found as a second pulse;
- a5) searching a third pulse and a forth pulse at next two 25 tracks below the track at which the second pulse is found; and
- a6) fixing other maximum value except the first pulse as the second pulse and executing the step a5).

3. The method as recited in claim 1, wherein T number of branches is chosen based on an equation as:

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$$T_k = \frac{(C_k)^2}{E_k} = \frac{(Hx c_k)^2}{c_k' H' H c_k} = \frac{(d' c_k)^2}{c_k' \Phi c_k} ,$$

wherein E_k represents energy of synthesized signal, C_k means correlation between target signal and synthesized signal, x is a target signal from which a predicted gain of an adaptive codebook is removed, H is a lower triangular toepliz convolution matrix, H^t is a transposed matrix of H , c_x is an algebraic code vector, c_x^t is a transposed matrix of c_x , d is a reverse filtered target signal, d^t is a transposed matrix of d , Φ is a correlation matrix of $h(n)$, which is impulse response.

15 4. The method as recited in claim 1, wherein in case of searching locations of two pulses in each track that has locations of 8 pulses in the algebraic codebook that has 5 tracks, the number of searching at a predetermined level 'L' is $4 \times L \times (8 \times 8)$ times.

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5. The method as recited in claim 4, wherein the number of searching a predetermined number of chosen branches 'T' is $T \times (4-L) \times (8 \times 8)$ times.

25 6. The method as recited in claim 1, wherein in case of searching locations of two pulses in each track that has

locations of 8 pulses in the algebraic codebook that has 5 tracks, a total number of searching is $4 \times L \times (8 \times 8) + T \times (4 - L) \times (8 \times 8)$ times.